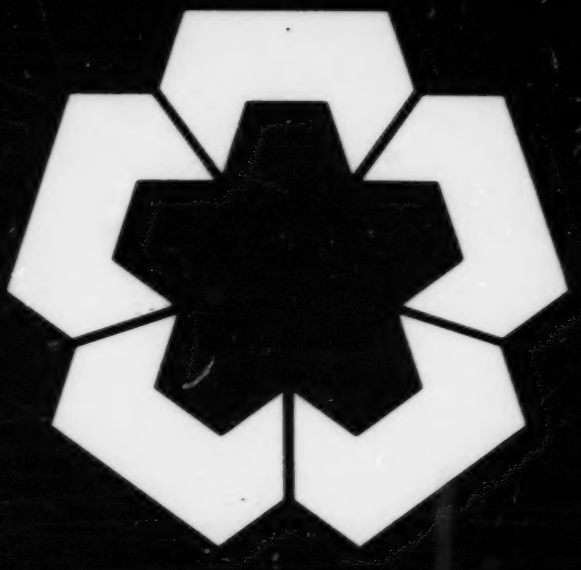
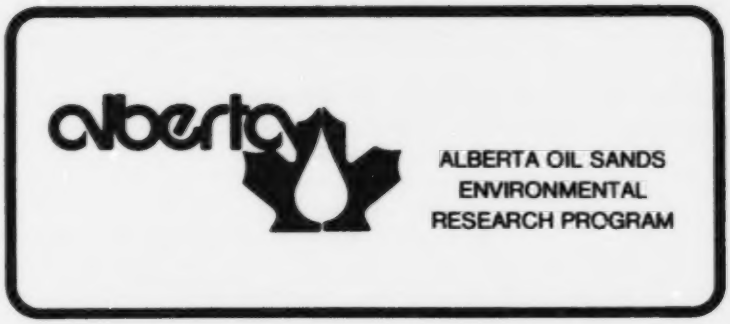


Alberta Oil Sands Environmental Research Program Annual Report 1981-1982

AOSERP Report 127

Alberta

The logo represents the interdisciplinary and holistic nature of the Division's environmental research programs. Each of the five sections of the symbol represent comprehensive programs on air, water, land, humans, and their constant interaction. The sections converge to form a cohesive chain, characteristic of an effective research organization. This cohesive bonding makes the sections blossom into the environment in the form of a flower — an Albertan wild rose.



Alberta Oil Sands Environmental Research Program

ANNUAL REPORT

1981-1982

AOSERP Report 127

Alberta
ENVIRONMENT
Research Management Division
14th Floor, Standard Life Centre
10405 Jasper Avenue,
Edmonton, Alberta, Canada
T5J 3N4

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

RESEARCH REPORTS

These research reports describe the results of investigations funded by the Alberta Oil Sands Environmental Research Program. This program was designed to direct and co-ordinate research projects concerned with the environmental effects of development of the Athabasca Oil Sands in Alberta.

A list of research reports published to date is included at the end of this report.

Enquiries pertaining to the reports in the series should be directed to:

Research Management Division
14th Floor, Standard Life Centre
10405 Jasper Avenue
Edmonton, Alberta
T5J 3N4
(403) 427-3946

Alberta Oil Sands Environmental Research Program

Annual Report 1981/82

AOSERP Report 127

This report may be cited as:

Research Management Division. 1982. Alberta Oil Sands Environmental Research Program Annual Report 1981/82. Prep. by Alberta Oil Sands Environmental Research Program for the Research Management Division. AOSERP Report 127. 43 pp.

The Hon. F. Bradley
Minister of the Environment
222 Legislative Building
Edmonton, Alberta

Sir:

Enclosed is the report "Alberta Oil Sands Environmental Research Program Annual Report 1981/82."

This report was prepared for the Research Management Division, through the Alberta Oil Sands Environmental Research Program.

Respectfully,

W. Solodzuk, P.Eng.
Deputy Minister, Alberta Environment

This report is made available as a public service. The Department of Environment neither approves nor disagrees with the conclusions expressed herein, which are the responsibility of the authors.

ALBERTA OIL SANDS ENVIRONMENTAL

RESEARCH PROGRAM

ANNUAL REPORT 1981/82

Research Management Division
Alberta Oil Sands Environmental
Research Program

AOSERP Report 127

February 1983

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INTRODUCTION

INTRODUCTION

The Alberta Oil Sands Environmental Research Program (AOSERP) was created in 1975 as an independent program managed jointly by the Alberta and Federal Governments to fund, direct, and co-ordinate environmental research in the Athabasca Oil Sands area of northeastern Alberta (Figure 1). Following the unilateral withdrawal by the Government of Canada from the program on 31 March 1979, the responsibility for AOSERP activities was assumed by the Alberta Department of the Environment. At that time, the Research Management Division (RMD) was created within Alberta Environment by the amalgamation of the Research Secretariat and AOSERP.

Among its responsibilities, the Research Management Division provides research support services to the department by initiating, priorizing, funding, and managing scientific research programs and projects concerning the environment. AOSERP undertakes these activities specific to the Athabasca Oil Sands study area.

This report covers AOSERP-sponsored work pertaining to the 1981/82 fiscal year. The last detailed summary of the work activities of the AOSERP Program was contained in the "Alberta Oil Sands Environmental Research Program, 1975-1980: Summary Report," published in 1981. The summary report provides a comprehensive description of the work activities of AOSERP during its first five years.

At the beginning of the 1981/82 year, the Research Management Division had been organized into four systems (Figure 2): 1) Air, 2) Human, 3) Terrestrial, and 4) Water. Correspondingly, RMD staff was organized into four teams, with research into environmental problems being directed to the most relevant of the systems. Support for their activities was provided by other staff working in Operations and Information.

During the last month of the fiscal year, however, the Research Management Division was restructured to develop an integrated interdisciplinary basis for research programs pertaining to both short- and long-term environmental problems and priorities. To this end, the

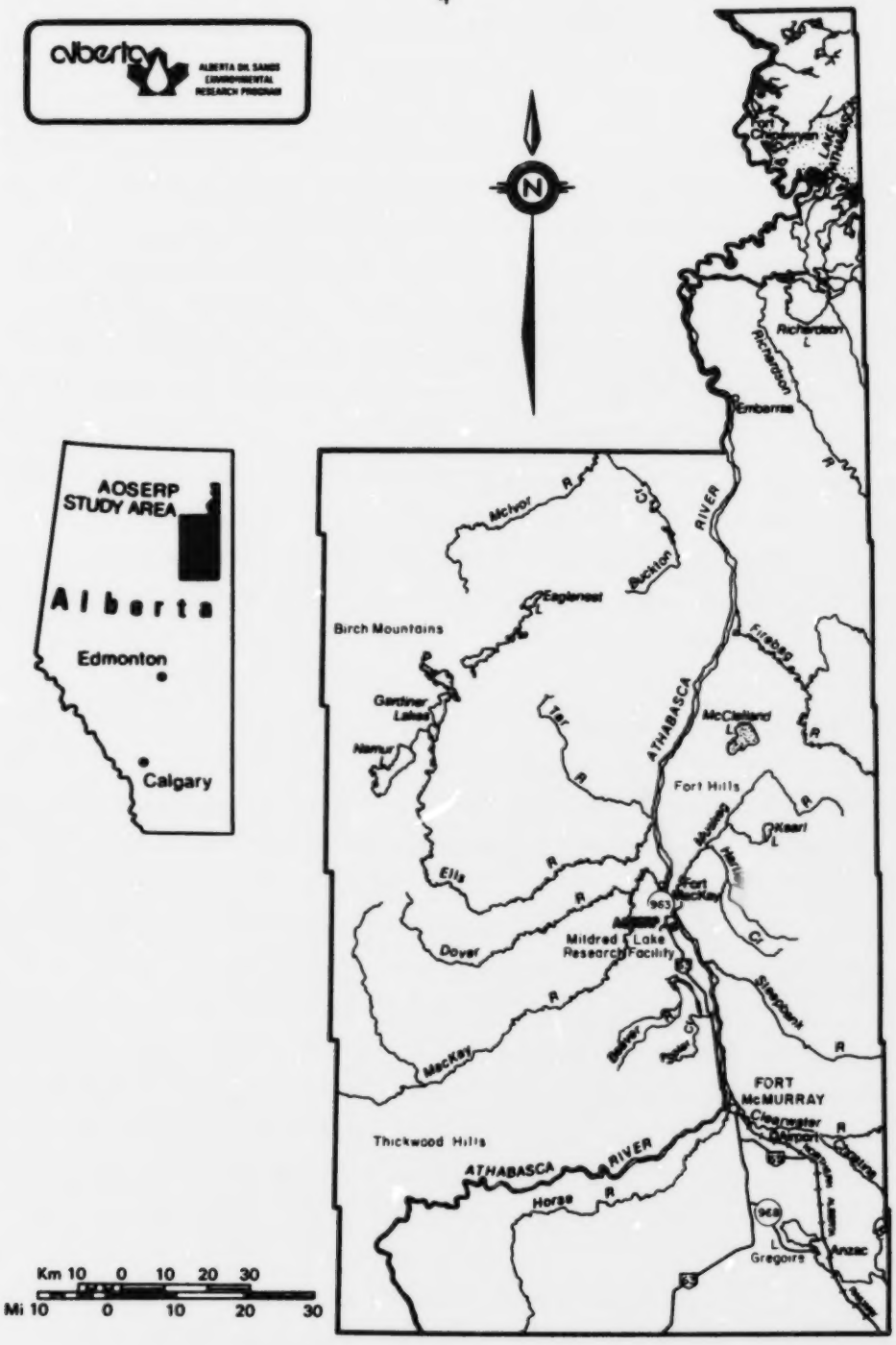

Figure 1. Map of the AOSERP study area.

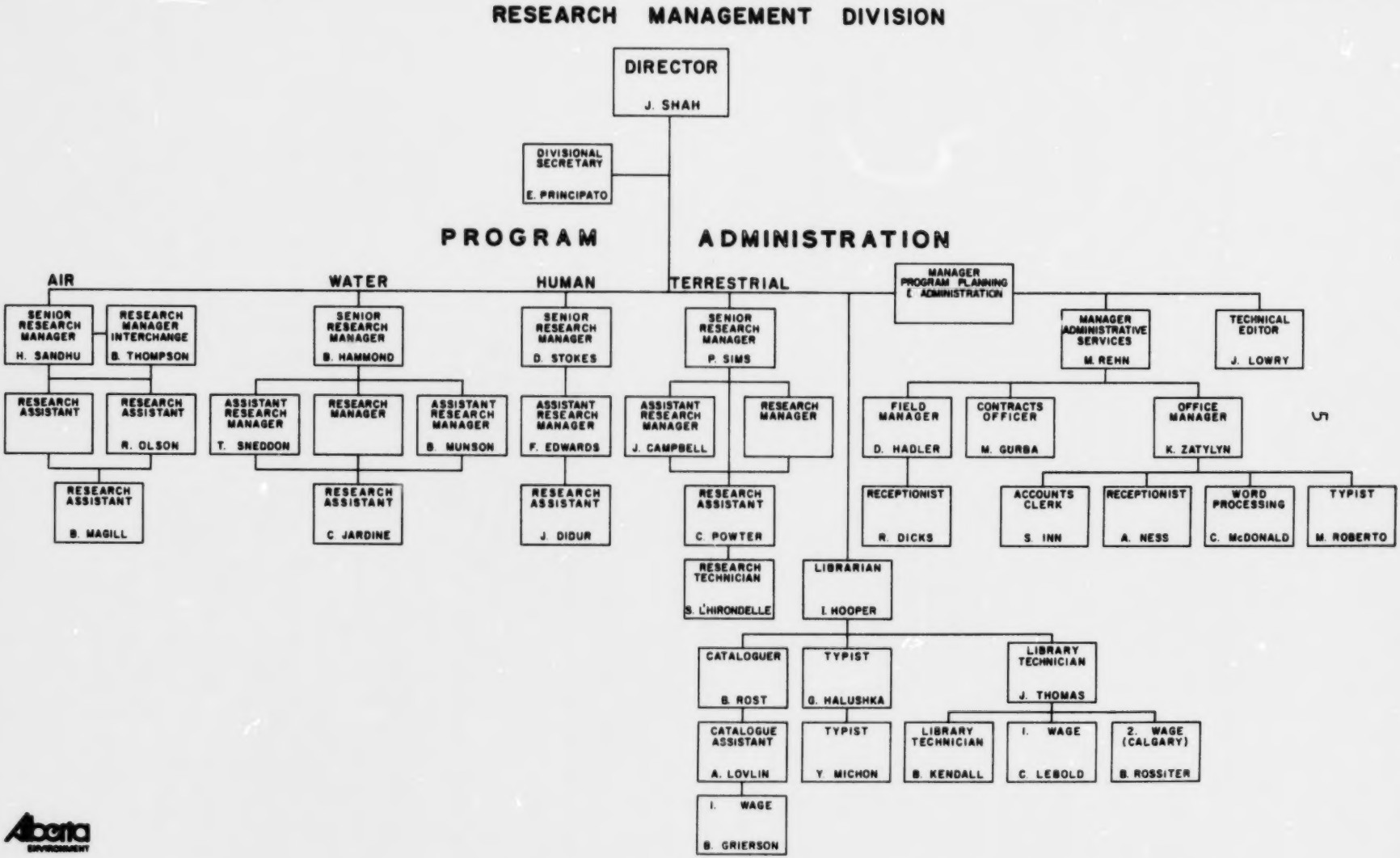

Figure 2. Research Management Division organizational chart.

functional management mode was replaced by a program management mode which combines the best features of hierarchical and matrix management. The new program management mode offers several advantages over the previous organizational structure as it brings together expertise from all systems to arrive at solutions for environmental problems in the AOSERP study area.

Operational Activities

Monies allocated to the AOSERP Program in 1981/82 amounted to $2,920,139. Table 1 gives a three-year breakdown of expenditures in the Athabasca Oil Sands region. More than half of the total funds allocated to RMD was spent on research into the Oil Sands region of the province, thereby giving a high priority to this program. Research funded by AOSERP was most often in the form of contracts to consultants or universities or, in a few cases, by grants to Alberta universities and professional societies. The results of these research activities are evident from the 30 AOSERP publications released by RMD during the 1981/82 fiscal year.

Field support staff in the Division maintained an office in Fort McMurray and a research facility at Mildred Lake in the Athabasca Oil Sands region. Cognizant of the needs of industry, RMD made available the Mildred Lake facility for the use by industry on a cost-plus-recovery basis.

A Note as to the Organization of this Report

This report provides an overview of the AOSERP Program for 1981/82. For simplicity, the report is divided on the basis of the original system structure which existed for most of the program work year.

Table 1. Total funds committed to AOSERP, 1979 to 1982.

	1979/80	1980/81	1981/82
Administration	$ 721 452.00	$ 694 000.00	$ 582 532.00
Projects	$2 189 748.00	$1 170 550.00	$1 438 607.00
Grants	$ 88 800.00	$ 38 000.00	$ 30 000.00
Assets	--	$ 97 450.00	$ 41 000.00
TOTAL	$3 000 000.00	$2 000 000.00	$2 092 139.00

AIR SYSTEM

AIR SYSTEM ACTIVITIES

Transboundary air pollution, especially acid rain and long range transport of air pollutants, has attracted a great deal of attention locally, nationally, and internationally. Air System managers represented the department on numerous provincial, federal/provincial and international committees dealing with this issue. An Air System manager was named as the co-ordinator and spokesman for departmental activities on acid rain and Long-Range Transport of Atmospheric Pollutants (LRTAP). The first annual report on monitoring and research studies related to acid rain and LRTAP in Western Canada was published.

During the fiscal year, a slight change in research direction was implemented for the AOSERP area (Athabasca Oil Sands). While the acquisition of baseline data decreased, new technology in remote sensing of the atmosphere was exploited.

The capabilities of acoustic doppler radar to remotely sense atmospheric parameters has encouraged the Air System to develop research projects in this area. Initial project planning and the acquisition of an acoustic sounder has been completed. To further research in this area, a co-operative project has been undertaken with industry to assess the accuracy and reliability of acoustic sounder data as compared with conventional technology.

The transport and removal mechanisms of anthropogenic pollutants by atmospheric processes continues to be an active research area. The fifth summer event precipitation chemistry project was completed with the co-operation of Alberta Environmental Centre and Alberta Forest Service. The major ions present in the precipitation were determined along with the heavy metals. This analysis has provided further documentation of deposition patterns over the Athabasca Oil Sands area. The depth of the snowpack was also surveyed again to supply a continuing record for climatological studies and to support the ongoing studies of the hydrology of this region.

The emphasis on model development shifted toward the applications research area. A user-oriented frequency distribution

dispersion model was finalized and its applications to air quality studies were reviewed. Windflow patterns in the oil sands area were studied through the application of a mesoscale small area wind model. Through the development and use of these models, information gaps were identified, leading to a joint government/industry project to assess meteorological data acquisition systems to replace the present network.

The Air System has worked closely with the Terrestrial System of RMD to co-ordinate meteorological and air quality information required for an ecosystem monitoring project. Output from a dispersion model was synthesized to assist in sample plot locations. Co-ordination of air quality instrumentation for the project was also undertaken by Air System personnel.

PROJECTS

Air Quality Data Acquisition in the AOSERP Area

At ten monitoring sites in the Oil Sands production area and one in the town of Fort McMurray, measurements were made for sulphur dioxide, carbon monoxide, hydrogen sulphide, nitrogen oxide, and particulate matter. These values were monitored in conjunction with nine meteorological stations. Data summaries are available from RMD.
Funding: $140 000.00 (Jointly funded by the Research Management Division and Pollution Control Division)

Airshed Management Modelling Systems for the AOSERP Area Phase III

This project was undertaken to develop a model capable of providing a versatile, user-oriented display of a frequency distribution and average ground level concentration of pollutants. It will provide information to managers relating the pollution in the AOSERP Area to future industrial development needs.
Funding: $11 000.00

AMOCO Gregoire Lake Monitoring Program

Ground level concentrations of sulphur dioxide, carbon monoxide, nitrogen oxides, and particulates were measured in the vicinity of the in situ pilot plant near Stoney Mountain. Surface meteorological parameters were also measured.
Funding: $27 500.00

Computer Modelling of Low-Level Winds and Temperatures over the Southeastern AOSERP Study Area

A low-level planetary boundary layer model has been adapted to the central AOSERP study area to provide data on low-level winds and temperatures. It incorporates the effects of topography and thermal circulations on low-level wind flow. The model formulation requires less detailed meteorological initialization than a previous version, yet

maintains the same physical processes. This change will allow the model to be more easily adapted to other areas of Alberta where detailed input data are not available.
Funding: $9 460.00

Event Rain Sampling in the Oil Sands Area

The objective of this project was to sample rain events at 15 locations in the oil sands area. Chemical analyses for sulphate, nitrate, chloride, ammonium, potassium, calcium, sodium, magnesium, and pH provided data for evaluation of deposition rates.
Funding: $35 000.00

Modernization of AOSERP MAPS Automatic Reporting Network

Investigations are being conducted to evaluate the design and cost for modernizing the AOSERP MAPS Automatic Reporting Network. The alternatives are either to repair and upgrade the existing components; to procure and implement a new, state-of-the-art system; or to effect a combination of these two. It appears that a decision will soon be reached.
Funding: $ 7 000.00 (Jointly funded by the Research Management Division and Syncrude Canada Ltd.)

Oil Sands Extraction, Upgrading, and Emission Technology Review

The attainable performance of abatement technologies with respect to gaseous emissions and the recovery of sulphur is limited by the technology available at the time of application or final design. To update the 1976 report "Evolution of Pollution Abatement Technology as Applied to the Alberta Oil Sands," a study was initiated which reviews recent literature sources and contacts process licensors and vendors for the most current technological developments.
Funding: $90 000.00

Snowpack Chemistry in the Oil Sands Area: Final Report

The objective of this study was to determine the pattern and rate of winter deposition of pollutants. Snow samples were analysed

for chemical constituents and results were compared with a 1976 survey.

Funding: $9 048.00

TAGA Ambient Air Monitoring Survey

The objectives of this study were to sample and analyse ambient air in the vicinity of selected industrial sites in Alberta. The chemical composition of these ambient air samples was used to identify and track selected pollutants. The chemical analyses were conducted by employing a TAGA 3000 Mobile Laboratory.

Funding: $50 000.00 (Jointly funded by the Pollution Control Division and Research Management Division)

PUBLICATIONS

Bottenheim, J.N. and O.P. Strausz. 1981. Development of a chemically reactive plume model for application in the AOSERP study area. Prep. for the Alberta Environment, Alberta Oil Sands Environmental Research Program by the Department of Chemistry, University of Alberta. AOSERP Report 117. 159 pp.

Danard, M. and M. Gray. 1981. Computer programmer's supplement to "Modelling topographic effects on winds in the Alberta Oil Sands area." Prep. for Alberta Environment, Research Management Division by Atmospheric Dynamics Corporation. RMD Report OF-33. 19 pp.

Danard, M. and M. Gray. In prep. Modelling topographic effects on winds in the Alberta Oil Sands area. Prep. for Alberta Environment, Research Management Division and Pollution Control Division. September 1981. 82 pp.

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Murray, W.A. 1981. Gregoire Lake monitoring program: six month report, April to September 1979. Prep. for AMOCO Canada Petroleum Company Ltd. and Alberta Environment, Research Management Division. RMD Report L-69. 66 pp.

Murray, W.A. 1981. The snowpack survey in the AOSERP study area. Prep. for Alberta Environment, Alberta Oil Sands Environmental Research Program by Promet Environmental Group Ltd. AOSERP Report 125. 137 pp.

Peters, R.R., H.S. Sandhu, and W.D. Hume. 1981. An analysis of precipitation chemistry in the oil sands area of northern Alberta. Proceedings of Air Pollution Sessions. Canada Meteorological and Oceanographic Society, 15th Annual Congress; 1981 May 27-29; Saskatoon, Saskatchewan. 10 pp.

Strosher, M.M. 1981. Background air quality in the AOSERP study area, March 1977 to March 1980. Prep. for Alberta Environment, Research Management Division by Pollution Control Division. AOSERP Report L-73. 84 pp.

Technical Committee for the Long-Range Transport of Atmospheric Pollutants in Western Canada. Western Canada LRTAP Activities: Annual report 1981; a report on monitoring and research studies related to acid rain and long-range transport of atmospheric pollutants in Western Canada. Edmonton: Technical Committee for the Long-Range Transport of Atmospheric Pollutants in Western Canada. 1981.

HUMAN SYSTEM

HUMAN SYSTEM ACTIVITIES

Human System research in the oil sands area has functioned at a reduced level over the last year. Work consisted of synthesizing already-gathered data. Because the research direction has been modified, information must be collected in such a way that it is of value to the agencies who use this information. Therefore, translation of data into a policy and into usable information was piloted last year and will become an integral part of every human system research project. Data from Fort McMurray has been re-analysed and re-interpreted to help policy formulation by the New Town Planning Board in Northern Alberta. The Human System also worked closely with the Air System and the Environmental Health Division of the Department of Social Services and Community Health to assess the feasibility of looking at the environmental health status of people living in Fort MacKay. This project was eventually taken over by the Federal Government.

PROJECTS

An Integration and Synthesis of AOSERP Human System Research Results

Since 1975, data have been collected under the auspices of AOSERP to determine the changes that have taken place in the oil sands area due to the development of the area's resources. This project will provide a synthesis of the data collected to date.

Funding: $15 538.00

Human Side of Energy

A forum on the Human Side of Energy was held in August 1981 at the University of Alberta. It attracted 375 people from the US and Canada who discussed how issues of energy development affect human populations. Included were such topics as: planning for energy development; impact of megaprojects on Albertans; and the future of native participation in Canadian resource development.

An issue of the Department's magazine--Environment Views--was based on this forum. A set of abstracts from the papers presented at the forum is available through the Faculty of Extension, University of Alberta.

Funding: $20 030.00 (Jointly funded by Alberta Environment, Earth Sciences Division and Research Management Division)

Policy Analysis of Fort McMurray Data

Data collected in a 1979 study of family adjustment in Fort McMurray were re-analysed and re-interpreted in the light of planning and policy options for the proposed new town in northeast Alberta. This information came from the New Town Planning Board and the re-interpreted information can be used for future planning.

Funding: $16 500.00

Research Management Framework

An orderly, rationalized way of conducting research was commissioned by the Human System. This included close interaction with the management consultant to ensure that the framework matched the changing needs of the system. A five-page digest is being written and will be available shortly.

Funding: $10 900.00 (Jointly funded by Alberta Oil Sands Environmental Research Program and the Research Management Division)

PUBLICATIONS

Gartrell, J.W., H. Krahn, and F.D. Sunahara. 1980. A study of human adjustment in Fort McMurray. Volume II: technical manual. Prep. for Alberta Environment, Alberta Oil Sands Environmental Research Program by Thames Group Research Inc. through the University of Alberta, Population Research Laboratory. RMD Report L-68. 189 pp.

Krahn, H. In prep. New resource towns planning concerns: data report. Prep. for Alberta Environment, Alberta Oil Sands Environmental Research Program. RMD project 81-27.

Littlejohn, C. and R. Powell. 1981. A study of native integration into the Fort McMurray labour force. Prep. for Alberta Environment, Alberta Oil Sands Environmental Research Program by Canadian Institute for Research in the Behavioural and Social Sciences. RMD Report L-70. 168 pp.

Parkinson, A., S.W. Montgomery, and R.D. Humphreys. 1980. A study of the impact of construction camps on the people of northeast Alberta. Prep. for Alberta Environment, Alberta Oil Sands Environmental Research Program by Urban Consultants Ltd. and R.D. "Reg" Humphreys Engineering and Management Consultants Ltd. RMD Report OF-23. 121 pp.

Sklofsky, J. In prep. Policy translation. New resource towns planning concerns: policy report. Prep. for Alberta Environment, Alberta Oil Sands Environmental Research Program. RMD project 81-27.

TERRESTRIAL SYSTEM

TERRESTRIAL SYSTEM ACTIVITIES

During 1981, a concerted effort was made to develop a program of research in support of biological monitoring. Studies funded and managed by the Terrestrial System dealt primarily with developing technology to determine the effects of atmospheric pollutants on terrestrial ecosystems. The objective of this program was to assemble information necessary to determine and evaluate the effects of low levels of pollutants on vegetation and soils processes and to develop an early-warning capability for monitoring systems. Scientific experts were assembled by the Terrestrial System to identify, discuss, and establish priorities for research needs. The next step will be to solicit from industry input to develop the research program. In the meantime, several relevant research projects are being continued.

The Research Management Division has co-operated with the Alberta Oil Sands Technology and Research Authority in a three-year research professorship granted to Dr. E.C. Pielou, a noted ecosystem modeller from Dalhousie University in Halifax, Nova Scotia. Dr. Pielou is now teaching at the University of Lethbridge and has initiated a study on the effects of pollutants on forest vegetation in the oil sands region.

PROJECTS

Alberta Oil Sands Environmental Research Program. 5-Year Report: Review and Revision

This report is a summary of the studies performed from 1975 to 1980 under the auspices of the Alberta Oil Sands Environmental Research Program (AOSERP). The report describes the development and organization of the program, and the individual studies in each system (air, land, water, and human), and provides a discussion of the results obtained from the studies. Recommendations for future research are also provided.

Funding: $22 754.00

Complexity and Stability of Boreal Forest Ecosystems

This project was designed to determine and compare the structural dynamics of several common boreal forest vegetation associations existing along a deposition gradient of pollutants. This study has been initiated in the oil sands area with the establishment and description (soils and vegetation) of sixteen permanent study plots. Two or three state-of-the-art air quality monitoring trailers will be located in close association with these plots. Further studies are being carried out on relatively pollution-free forests in the Hondo/Slave Lake area.

A detailed research program is being developed in co-operation with industry scientists.

Funding: $87 280.00

Effects of Air Pollution on Natural Vegetation

This study will attempt to evaluate the relative effects of natural and anthropogenic factors on forest ecosystems. Morphologic and growth responses (past and present) in jack pine stands throughout the oil sands area will be studied to determine if the effects of pollution can be identified and quantified.

Funding: $102 000.00 (Jointly funded by Alberta Oil Sands Technology and Research Authority and the Research Management Division)

The Impact of Air Pollutant Mixtures on Forest Vegetation and Soils

This study concentrated on laboratory studies to determine the response of soils and vegetation to mixtures of aerial contaminants characteristic of those emitted from oil sands plants.

Funding: $82 000.00 (Jointly funded by Environment Canada, Canadian Forestry Service and the Research Management Division)

Oil Sands Soil Reclamation Project

This is a co-operative project of the Reclamation Research Technical Advisory Committee representing the government of Alberta, and the Oil Sands Environmental Study Group representing industries involved in oil sands development. A literature review was undertaken to determine the soil requirements of reconstructed soils on waste tailings sands. This information is being used in a current study to design reconstructed soils. This study is to test the effect of soil variables on woody plant performance, long- and short-term stability, and survival of the soil/plant system. A project proposal is being developed by an industry scientist and a Research Management Division scientist under the direction of the government-industry steering committee.

This project is managed by RMD, with funding contributed from the Heritage Trust Fund and the Oil Sands Environmental Study Group (OSESG).

PUBLICATIONS

Bliss, L.C., ed. 1979. Performance of vegetation on mined sands. Prep. for Alberta Environment, Alberta Oil Sands Environmental Research Program by the University of Alberta, Department of Botany. RMD Report OF-27. 251 pp.

LaRoi, George H. and Mike Ostafichuk. 1982. Establishment and vegetational survey of 16 Pinus banksiana-dominated permanent plots for the Athabasca oil sands ecological monitoring project in 1981. Prep. for Alberta Environment, Research Management Division by the University of Alberta, Department of Botany. RMD Report OF-34.

Smith, S.B. 1981. Alberta Oil Sands Environmental Research Program, 1975-1980: summary report. Prep. for Alberta Environment, Alberta Oil Sands Environmental Research Program by S.B. Smith Environmental Consultants Limited. AOSERP Report 118. 170 pp.

Turchenek, L.W. 1982. Soils of permanent sample plots in the Athabasca oil sands area. Prep. for Alberta Environment, Research Management Division by Alberta Research Council, Soils Department. RMD Report OF-36. 71 pp.

Turchenek, L.W. and J.D. Lindsay. 1981. Soils inventory of the AOSERP study area. Appendix. Prep. for Alberta Environment, Research Management Division by Alberta Research Council. RMD Report OF-31. 264 pp.

Turchenek, L.W. and J.D. Lindsay. In prep. Soils inventory of the Alberta Oil Sands Environmental Research Program study area: appendix 9.4. Prep. for Alberta Environment, Alberta Oil Sands Environmental Research Program by Alberta Research Council, Soils Department. RMD Report L-80.

WATER SYSTEM

WATER SYSTEM ACTIVITIES

Water System research in the oil sands area in the 1981/82 fiscal year involved major efforts in: fundamental research into surface water and groundwater; biological, chemical, and hydrometric monitoring; and investigations into the environmental consequences of in situ bitumen extraction technology. Geographically, studies were divided between the Athabasca and Cold Lake deposits.

Surface and groundwater fundamental research included studies to estimate, describe, and provide a predictive calibrated mathematical model for the distribution and circulation of water and sediment in the Athabasca River and Delta. Hydrologic and sediment regimes were also examined in disturbed and undisturbed sites in the Muskeg River basin. A water atlas project explored the possibility of producing a comprehensive inventory of all waters in Alberta.

Two major ongoing monitoring projects continued in the Athabasca Oil Sands area: water quality monitoring under the direction of the Pollution Control Division; and monitoring of the hydrometric and suspended sediment under the Technical Services Division. These projects continue to provide an uninterrupted set of baseline information for the region. A project to develop biological monitoring techniques for the Athabasca River was conducted concurrently with the water quality component.

In view of current pilot projects on in situ recovery of bitumen from the oil sands, and in anticipation of a potential increase in these activities in the future, several studies were developed to fully explore and evaluate the possible environmental implications of in situ extraction technologies. In co-operation with the Groundwater Branch of the Earth Sciences Division, research continued into induced seismicity related to fluid injection at Cold Lake. A positive seismic monitoring array is fully operational, and the data derived are being reduced and analysed by the University of Alberta. Projects studying the toxicology of products produced from the various in situ methods and the geomechanics of in situ development were conducted in co-operation with Alberta Oil Sands Technology and Research Authority (AOSTRA).

PROJECTS

A Regional Assessment of Hydrogeological and Hydrochemical Conditions in the Cold Lake Oil Sands Deposit

This project will develop a three-dimensional framework of the hydrostratigraphy, hydrodynamics, and hydrochemistry of the Cold Lake Oil Sands area. It will also identify the processes inherent to both in situ recovery and deep waste disposal methods, and evaluate their possible effects on local and regional groundwater regimes of the study area. Where significant effects are noted, recommendations will be made for further study aimed at the quantification of these potential impacts for local and regional scales. Phase I of this project is imminent.
Funding: $235 000.00 (Jointly funded by Alberta Research Council and the Research Management Division)

Biological Monitoring of the Athabasca River

This project was designed to develop biological monitoring techniques for implementation on large river systems.
Funding: $12 100.00

Cold Lake Seismic Array

This project will provide baseline seismicity information in the Cold Lake Oil Sands area. Further objectives are: to identify the source locations of the observed events and to identify or suggest their causes; to describe the environmental significance of observed seismic events and their relationship to current activities; to make recommendations concerning ongoing monitoring after the basic study is completed; and to design mitigative engineering features. Operation of the array and the dissemination of data are being carried out by the Earth Sciences Division.
Funding: $19 395.00

The Delineation of the Minimum Principal Stress Value, Determination of Fracture Orientation, and Mechanical Investigation of Colorado Clay Shales at the Cold Lake Oil Sands Deposit

This project will prepare a proposal and work plan for in situ measurement of the value of the minimum principal stress for at least five depths between the top of the Clearwater formation and the first confined aquifer in the drift in the Cold Lake area under the Beverly Channel.

Funding: None in 1981/82

Distribution and Circulation of Water and Sediment in the Athabasca River and Delta

This project was designed to estimate and describe how water from the Athabasca River is distributed through the delta system under various flow and ice conditions, and at various levels of Lake Athabasca. It will also estimate and describe the circulation and mixing of river water in Lake Athabasca under various conditions, and their relationship to outflows to the Slave River and to cross-connections with Mamawi Lake and Lake Claire. The distribution, circulation, and deposition of sand and fine sediment carried to the mouth of the Athabasca will be described for both the delta and Lake Athabasca. Flow-specific processes will be related to the possible contamination of the Athabasca River delta by upstream sources.

Funding: None in 1981/82

Hydrology and Sediment Yield of the Muskeg River Basin: Northeastern Alberta

This project will describe and explain the hydrologic and sedimentologic regimes of disturbed and undisturbed sites in the Muskeg River basin. It will also develop a predictive capability for the magnitude and frequency of flows, and the volume and size characteristics of material entering the river system from upland erosion as a result of the exposure of the mineral soil after muskeg removal.

Funding: $25 000.00

Hydrometric and Suspended Sediment Network

This is an ongoing project providing adequate streamflow information for an inventory of hydrology resources for the AOSERP study area. The data are to be used in water quantity and quality, water use, flood flow, and modelling studies. This project also provides background information on the temporal distribution of suspended sediment concentrations and discharges in streams within the AOSERP study area.
Funding: $9 000.00

Modelling the Circulation and Sediment Distribution in the Athabasca Delta Area

This system will provide a calibrated mathematical model capable of predicting the circulation patterns in the southwest end of Lake Athabasca and of indicating concentration distributions under various flow conditions. It will also relate LANDSAT imagery to water quality parameters, primarily suspended sediment concentrations.
Funding: $90 000.00

Oil Sands In Situ Combustion Products

This project was undertaken to chemically identify contaminants in the produced fluids and gases of in situ fire-flood produced bitumen, and to identify the possible environmental hazards and human health risks arising from these toxic and carcinogenic materials.
Funding: $100 000.00 (Jointly funded by AOSTRA and the Research Management Division)

Oil Sands Tailings Geomechanics

The objective of this project is to determine the nature and extent of oil sand tailings generation, materials balance, sludge behaviour, systems properties, and potentially beneficial treatments from a geomechanics and systems analysis point of view.
Funding: This project is currently at the proposal stage.

Processing and Analysis of Cold Lake Seismicity Data

This project was initiated to obtain data reduction and analysis services for digital seismic data derived from the Cold Lake Digital Seismic Array. A further objective was to initiate research into induced seismicity phenomena associated with in situ extraction of bitumen from the Alberta Oil Sands.

Funding: $25 000.00 (Grant from Esso Resources to the University of Alberta)

Study of the California and Other Water Atlas Projects and Proposal for an Alberta Water Atlas Study

The objective of this project is to study the recently-completed California Water Atlas project, as well as other projects for which reference materials are available in California and Alberta, to determine what alternative procedures and methods might be used to develop a Water Atlas of Alberta and to prepare an Alberta Water Atlas proposal. This proposal will include tentative tables of contents with comments on the options available, outlines of alternative development procedures, and estimates of cost.

Funding: $9 200.00

Water Quality Monitoring in the Athabasca Oil Sands Area

The objective of this project is to collect water quality data in the Athabasca Oil Sands area. The data provide a continuous set of baseline information for the region.

Funding: $150 000.00

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